REMARKS

Claims 1-11 and 13-17 are pending in the application.

Claim 13 is amended above to clarify what it is that the Applicant regards as the invention.

New claims 15-17 are added to the application above.

No new matter is added to the application by way of these claim amendments.

I. TRAVERSE OF THE ANTICIPATION REJECTION

The examiner rejected claims 1, 3, 7-9 and 13-14 for being anticipated by U.S. Patent No. 5,642,299 to Hardin et al. The examiner's rejection is traversed for at least the grounds set forth below.

A. Hardin Does Not Disclose A Plurality Of Linear Arrays

Linear image sensors and area image sensors are distinct and different categories of imaging sensors and this would be clearly understood by the skilled person. Specifically, linear image sensors have pixels aligned along a central axis whereas area image sensors have the pixels arranged in a rectangular (rows × columns) array pattern. Linear image sensors require relative motion between the sensor and the object being scanned. For example, when using a linear imaging sensor the object is scanned one line at a time, and can then be reconstructed one line at a time using knowledge of the relative motion between the object and the sensor. Area image sensors do not require this motion but instead employ electronic scanning to provide video data which represents light intensity at each of the scanned pixel locations within the sensor. This is an important distinction and goes to the heart of Hardin and the present invention in terms of the way the image processing apparatus operates. Namely, relative movement of the vehicle past a stationary vertical linear array effects scanning of the vehicle, thereby eliminating a matrix of sensor pixels and associated electronic scanning means. The linear array provides benefits of reduced technical complexity (and hence cost), reduced power consumption and can provide improved signal to noise ratio by enabling integration of amplifiers and filters into the linear array (not possible with pixel matrix imaging arrays).

In contrast, Hardin uses two-dimensional detector arrays, for example conventional CCD / video cameras. Specifically, Hardin uses two video cameras each having a pixel matrix array of light sensitive devices such as a CCD. (*See* Hardin, column 4, lines 61 – 63). Hardin, column 4,

lines 61 – 65 teach that the pixel array is scanned electronically in horizontal or vertical lines to provide video data which represents light intensity at each scanned pixel location. Video from left and right hand cameras in Hardin is captured simultaneously. (Hardin, column 7, lines 22 – 23). In the embodiment illustrated in Hardin Figure 18 the cameras are RS-170 standard video cameras (Hardin, column 12, lines 32 – 33 refer). This confirms that the cameras in Hardin are video cameras and not linear imaging arrays because RS-170 is an Electronic Industry Association (EIA) standard video format used in the United States. Specifically, an RS-170 video frame signal contains 525 lines of image data and is displayed 60 times per second. By way of support, it is clear from Figures 2, 3, 12, 13 and accompanying text in the specification description that the arrays are two dimensional and not linear arrays.

Based upon the distinctions between linear arrays and matrix arrays explained above, the examiner's argument that the video camera in Hardin is the same as a linear array of detectors is a mere artifice created by the examiner with the benefit of hindsight to enable the Hardin prior art to be read onto the present invention. Even though Hardin processes the target images from the pixel matrix arrays shown in Figure 4a by comparing a plurality of pairs of video lines from the video cameras (Hardin, Figure 5 refers), nowhere in Hardin is there any teaching to linear detector arrays.

B. The Determination Of Direction Of Movement Is Not Inherent From Hardin

Claims 1, 3, 7-9 and 13-14 are novel over Hardin because the claim requirement that the device determine the direction of movement is not inherent from Hardin. In order for a prior art reference to have an inherent feature or step, a structure or step in the prior art must necessarily function in accordance with the anticipated claim feature. *In re King*, 231 USPQ 136, 138 (Fed. Cir. 1986). Direction detection is not inherent from Hardin because, as will be explained below, there are some instance where Hardin cannot detect direction and, therefore, Hardin does not function to always ("necessarily") detect direction of movement.

As the examiner concedes on page 3 of the Office Action, there is no explicit teaching in Hardin that the system described therein detects direction of movement. Rather, Hardin only determines the speed of the target and whether the target is approaching the speed-detection apparatus or receding there-from (based on the slope of the linear regression line - see Hardin, column 12, lines 46 - 65). The direction of movement is not inherent in Hardin because there are instances where the direction of movement is ambiguous and cannot be determined.

Hardin calculates the distance (range, R) from the target to the centre of the apparatus baseline using trigonometry, in particular using difference in pointing angles to the target between the two cameras. The range measurement is performed at least two different times to give R1 and R2, and the difference in range to the target as a function of the time difference is used to calculate the speed of the target, i.e. speed = (R2-R1)/(T2-T1). See Hardin, column 2, lines 4 - 7; column 3, lines 20 - 38; and column 5, lines 33 - 44.

There is no teaching in Hardin that the internal angle measurements (alpha, beta and gamma) are used in conjunction with the range(s) information to indicate whether the target is to the left or to the right of a centre-line which bisects the centre of the apparatus baseline and which is arranged perpendicular thereto (e.g. a line which extends from P through M to the detector arrays in Fig. 4a). Accordingly, although the apparatus described in Hardin is capable of calculating the speed of the target and determining whether the target is approaching or receding, it is not inherently capable of determining lateral direction of movement of the target. A good example of this is when the target lies on the centre-line at the first time T1 of measuring the range R1 and which subsequently moves to the left or right thereof by the second time T2 of measuring the range R2. In this instance, the apparatus is unable to tell whether the target has moved to the left or to the right, but is still able to calculate the ranges R1, R2 and the speed. Thus, contrary to Examiner's assertion, it is not inherent from Hardin that the direction of movement will always fall out from the calculation of speed.

C. Claims 13-14 Are Independently Novel

Claim 13 is independently novel because the examiner has not shown that Hardin discloses a device that is arranged to image a detected object sequentially. Towards this end, claim 13 is amended above to clarify that the detectors are arranged to sequentially image the detected object. The amendment is intended to clarify that in the present invention the object is imaged by a first linear array in a first area of interest, then by a second linear array in a second area of interest etc. Hence, in the present invention the linear arrays follow one another in a specific sequence to image the object in different areas of interest within the scene. In contrast, in Hardin the target is imaged simultaneously by both cameras in a first area of interest and subsequently imaged simultaneously by both cameras in a second area of interest.

In rejecting claim 13, the examiner alleges that a specific structure of Hardin "implies" that the object is detected sequentially. What a reference implies is irrelevant to a factually

complete novelty rejection. In order to anticipate, a reference must expressly show the claimed feature arranged as claimed or the feature must be inherent from the reference. The examiner has not provided any factual evidence or either in rejecting claim 13. Therefore, the examiner's rejection of claim 13 is legally insufficient and must we withdrawn.

Claim 14 is also independently novel and patentable because the examiner's rejection is legally insufficient in that it does not provide an adequate factual basis for the examiner's novelty rejection. As noted above, in order for a reference to anticipate, the reference must show the same invention in as complete a detail as claimed. *Richardson v. Suzuki Motor Co.,* 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). Moreover, the elements must be arranged in the reference as required by the claim. *In re Bond*, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990).

Claim 14 requires "the linear arrays are disposed such that as the detected object passes through the scene a component of movement thereof is substantially orthogonal to an alignment direction of said arrays". It is the examiner's position that Hardin teaches "the light sensitive element may be oriented so that the line scan direction is perpendicular to the base line" and alleges that what Hardin teaches "<u>is similar to</u> the orthogonal to an alignment direction of the arrays". (Emphasis added). Anticipation can not be demonstrated by showing that a feature of the prior art is "similar" to a claim feature. The law of anticipation requires the examiner to demonstrate that the claimed features and indeed the entire claimed structure is identically found in the prior art. The examiner rejection of claim 14 does not meet this legal requirement of an anticipation rejection so the rejection must be withdrawn.

Indeed, the examiner has not shown that the claim 14 feature is found in Hardin because there is no teaching in Hardin to arranging <u>linear</u> detector arrays such that as the object passes through the scene a component of movement thereof is substantially orthogonal to an alignment direction of said arrays. Rather, in Hardin the arrays are two-dimensional arrays arranged such that as the object passes through the scene a component of movement thereof is substantially parallel with the line scan direction of said arrays, i.e. the line scan direction is parallel with the base line b (see Hardin, Figs. 4 - 6 and the accompanying text in columns 5 and 6). In the alternative embodiment highlighted by the examiner in column 3, lines 4 - 19 the two-dimensional array is oriented so that the line scan direction is perpendicular to the baseline,

however in this embodiment the baseline is vertical (see Fig. 13) and hence the line scan direction is still substantially parallel with a component of movement of the object.

II. TRAVERSE OF THE OBVIOUSNESS REJECTIONS

A. Traverse of the Hardin/GB '388 Obviousness Rejection

The examiner rejected claims 2 and 4 for being obvious over Hardin et al. as applied to claim 1 and further in view of Burgess GB 2154388.

Claims 2 and 4 are non-obvious and patentable by virtue of their dependence upon independent claim 1 which is patentable for at least the reasons recited above.

B. Traverse of the Hardin/Vock et al. Obviousness Rejection

The examiner rejected claims 5 and 6 for being obvious over Hardin in view of Vock (USP 5,798,519).

Claims 5-6 are non-obvious and patentable by virtue of their dependence upon independent claim 1 which is patentable for at least the reasons recited above.

C. Traverse of the Hardin/Vock et al. Obviousness Rejection

The examiner rejected claim 10 for being obvious over Hardin in view of Zhdanov (USP 6,633,256).

Claim 10 is non-obvious and patentable by virtue of its dependence upon independent claim 1 which is patentable for at least the reasons recited above.

D. Traverse of the Hardin/Vock et al. Obviousness Rejection

The examiner rejected claim 11 for being obvious over Hardin in view of Martin (USP 6,243,131).

Claim 11 is non-obvious and patentable by virtue of their dependence upon independent claim 1 which is patentable for at least the reasons recited above.

III. NEW CLAIMS 15-17

New claims 15-17 are added to the application above and are believed to define patentable subject matter.

Claim 15, which is dependent upon claim 1, requires the detected object to be imaged consecutively by each of the plurality of linear arrays of detectors as said detected object passes

through the scene. This claim 1 amendment finds basis in the penultimate paragraph on page 8 of the published PCT application.

Independent claim 16 is similar to independent claim 1 except that it excludes the use of video cameras in the linear array of detectors. The addition of this negative limitation into new Independent claim 16 eliminates Hardin as an anticipatory reference. In addition, the addition of the negative limitation does not add new matter to the specification.

Negative limitations are permissible in a claim so long as they do not create issues of indefiniteness and undue breadth and so that obviousness is avoided. The negative limitation added to claim 16 finds more than adequate support in the specification. In particular, the specification does not disclose the use of video cameras as detectors. Therefore, the specification clearly apprises one skilled in the art at the time of the invention that the claimed linear arrays of detectors are not video cameras.

A similar negative limitation was determined by the Board of Patent Appeals to be supported by a specification even though the specification did not refer to the negative limitation. *ex Parte Parks*, 30 USPQ 2d 1234, 1236 (Bd. Pat. App. & Int'f. 1993). In *ex Parte Parks*, a claim was amended to include the negative limitation that decomposition be conducted "in the absence of a catalyst". The Board concluded that even though there was no literal description of the negative limitations the specification still supported the negative limitation because (1) the specification nowhere mentioned the use of a catalyst; and (2) there was every opportunity to discuss the uses of a catalyst in the specification. *Id.* at 1237. Just as in *ex Parte Parks*, the specification of the present application is completely silent about the use of video cameras as detectors. Thus, as in *ex Parte Parks* the negative limitation added to claim 16 finds support in the specification.

New independent claim 17 is similar to independent claim 1 except that it includes the negative limitation that the linear array of detectors are not arranged to image the detected object simultaneously in a plurality of areas of interest. This added claim feature further distinguishes new claim 17 from Hardin which discloses capturing video images from the left and right hand cameras simultaneously at each time T1, T2 ... Tn (See Hardin, column 7, lines 23 - 24). The negative limitation included in claim 17 does not add new matter to the application for essentially the same reasons as discussed in relation to the negative limitation added to new claim 16.

CONCLUSION

All pending application claims are believed to be patentable for the reasons recited above. Favorable reconsideration and allowance of all pending application claims is, therefore, courteously solicited.

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Date: November 16, 2010

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